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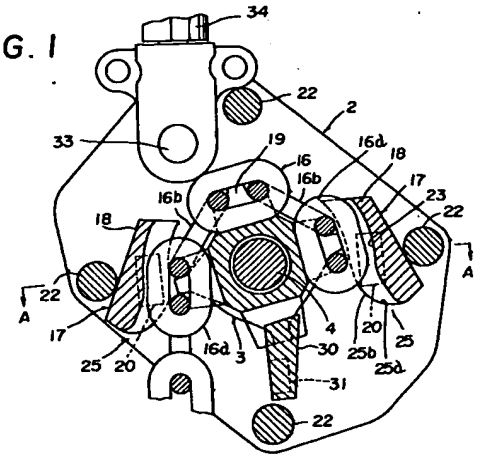
(54) Lever type traction machine.

(57) The invention relates to a lever type traction machine in which is disposed between side plate (1,2) for rotatably supporting a load sheave (3) and at both radial sides thereof, a pair of chain holders (17) for holding toward the load sheave (3) a chain (16) entering between the side plates to engage with the load sheave and which is provided at the rear side of each chain holder (17) in the entering direction of the chain with a chain bulging restraint portion (18) for restraining the chain from bulging at the rear of the chain holder (17).

FIG. 1



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The present invention relates to a lever type traction machine , and more particularly to a lever type traction machine which interposes between side plates a load sheave engageable with a chain so that the load sheave is driven by operating an operating lever so as to haul the chain .

Conventionally, such lever type traction machine has been proposed which, as disclosed in, for example , the Japanese Utility Model Publication Gazette No. Hei 2-6065 and shown in Fig.5, is so constructed that a load sheave A engageable with a chain B is rotatably interposed between side plates, an operating lever is operated to drive a driving shaft S directly connected to or in association with the load sheave A through a speed reduction mechanism so as to haul the chain B engaging with the load sheave A, and a pair of chain holders C1 and C2 for guiding to the load sheave A the chain B entering into between the side plates are provided at both radial sides of the load sheave A therebetween.

The chain holders C1 and C2 in the lever type traction machine, as shown in Fig.5, each form a guide surface in a circular arc at the opposite surface to the load sheave A, and the guide surface is formed in a circular arc around the center apart from the guide surface with respect to the axis of the driving shaft so that the chain B entering between the side plates can be guided toward the load sheave A

At both side surfaces of the respective chain holders C1 and C2 are provided circular projections to be fitted into fitting bores provided at the side plates respectively and are provided insertion bores F for stay bolts E for fixing the side plates respectively, and the stay bolts E are screwably tightened by nuts so as to fixedly put each chain holders C1 or C2 between the side plates at the two positions of the projection D and stay bolt E.

In the lever type traction machine constructed as the above-mentioned, the guide surface at each chain hplder C1 or C2 is formed in a circular arc and a gap between the guide surface and the load sheave A is wide ahead in the entering direction of the chain, whereby the chain B can properly be guided so as to enter between the side plates toward the load sheave A and be prevented from rising with respect to the load sheave A at the portion of smaller gap. However, the guide surface of each chain holder C1 or C2 similarly is formed in a circular arc and wide rearwardly in the entering direction , whereby, when the chain is hauled, the load sheave is free-rotatably controlled so as to adjust the chain in length as discussed below, or load traction is released in the state where the lever type traction machine is turned sidewise or upside down, that is, in the state where the drawing plane in Fig.5 is turned upside down, the chain B engaging with the load sheave A , as shown by the chain line in Fig.5, may bulge through gravity rearwardly in the entering direction of the chain B with respect to each chain holder C1 or C2. Such bulging chain B interferes with the stay bolt E , or links of the chain B are intertwined with each other, thereby creating the problem in that the load sheave A is hindered from being smoothly driven.

The traction machine, usually, makes the load sheave freely rotatable in the traction direction or the traction releasing direction as the above-mentioned, but since the guide surface of each holder C1 or C2 is formed in a circular arc, when the chain B is intensively hauled in the twisted condition during the free rotation operation, the chain B may enter between each chain holder C1 or C2 and the load sheave. As the result, the problem is created in that the chain B is caught by the chain holder C1 or C2 to lock the free rotation of the load sheave A .

The chain holders C1 and C2 each fit the fitting projection D into the round fitting bore at each side plate and insert the stay bolt E into the insertion bore F, so as to be fixedly sandwiched between the side plates while being locked at the two positions of the projectin D and stay bolt E. Hence, the chain holders C1 and C2 must be constructed to form thereon the insertion bores F other than projections D D so as to be complicated in construction and take much time for machining. Also, the same are large-sized and increase in weight due to formation of the insertion bores F . Moreover, the chain holders C1 and C2, when fixedly put between the side plates, takes much time to insert the stay bolts E into the insrtion bores F respectively, thereby creating the problem in that the assembly is complicated.

An object of the present invention is to provide a lever type traction machine which, even when operated for traction in the state where it is turned sidewise or upside down or the load sheave is intended to freely rotate, can prevent the chain from bulging rearwardly in the entering direction thereof at a chain guide.

A lever type traction machine of the present invention which interposes between side plates a load sheave engageable with a chain so as to drive the load sheave by operation of an operating lever 14 and to haul a chain carrying a load attached thereto, is characterized in that a pair of chain holders for holding toward the load sheave the chain entering between the side plates are disposed at both radial sides of the load sheave therebetween and that at the rear side of each chain holder in the entering direction of the chain when entering between the side plates from the outside thereof to the inside is provided a chain bulging restraint portion for restraining the chain

from bulging radially of the load sheave.

It is preferable that a guide for correcting twist of the chain entering between the load sheave and the chain holder is provided in front of the load sheave in the entering direction of the chain.

Also, it is preferable that ;at the side surfaces of each chain holder opposite to the side plates are provided rectangular projections projecting from the side surfaces; at chain holder mounting portions at the side plates are provided rectangular bores engageable with the reactangular projections rspectively; and the side plates areg fixed to each other through a plurality of stay bolts, so that, when the sdie plates are fixed through the stay bolts, the chain holders are sandwiched between the side plates.

Accordingly, when the lever type traction machine hauls a load, releases the traction, or freely rotates the load sheave while being turned sidewise or upside down, the chain, which enters between the side plates from the outside thereof to the inside, is guided by one chain holder positioned at the entering side and engaes with the load sheave and prevented from rising with respect thereto. At this time, the chain which enters between the side plates and then leaves the chain holder at the chain entering side, intends to bulge by the gravity of the chain at the rear of the chain holder. However, at the rear portion of each chain holder is provided the chain bulging restriction portion, whereby the chain is restrained thereby from bulging Accordingly, the chain having passed the chain holder is guided toward the load sheave without bulging and then guided toward the other chain holder,while engaging with the load sheave. Hence, the chain can be prevented from bulging to interfere with a stay bolt or intertwining chain links with each other to cause locking of the rotation of load sheave.

At the front of each chain holder in the entering directin of the chain toward the load sheave is provided a guide for correcting twist of the chain, so that, when the load sheave is operated to freely rotate, even if the chain is intended to enter, while being twisted, between the load sheave and the chain holder, the guide can forcibly correct and eliminate the twist of chain. Hence, there is no fear that the twisting chain is caught by the chain holder at the front thereof in the chain entering direction to lock the load sheave.

At the side surfaces of each chain holder opposite to the side plates are provided rectangular projections projecting from the side surfaces and at the chain holder mounting positions of the side plates are provided rectangular fitting bores into which the rectangular projections are fitted respectively,so that the chain holders can be fixedly sandwiched between the side plates by means of the stay bolts therefor, thereby enabling the chain holders to be not-rotatably fixed to the side plates. Therefore, the chain holders need not be fixed by stay bolts perforating therethrough as the conventional example, whereby the chain holders can be simple to construct, machine and assemble, and be miniaturized and lightweight.

These and other objects of the invention will be seen by reference to the description, taken in connection with the accomopanying drawings, in which:-

Fig.1 is a sectional view of the principal portion of a lever type traction machine of the present invention,

Fig.2 is an enlarged sectional view taken on the line A-A in Fig.1,

Fig.3 is an enlarged sectional view of a guide at a chain holder,

Fig.4 is a sectional view of a lever type traction machine to which the present invention is applied, and

Fig. 5 is a sectional view explanatory of the problem in the conventional example.

A lever type traction machine shown in Fig.4 is a typical embodiment of the present invention , which is so constructed that a load sheave 3, into which a driving shaft 4 is relative-rotatably inserted, is rotatably supported to first and second side plates 1 and 2 disposed opposite to each other and spaced at a predetermined interval, and a reduction gear mechanism 5 comprising a plurality of reduction gears is interposed between the axially outside end of the driving shaft 4 projecting from the second side plate 2 and the load sheave 3, so that the reduction gear mechanism 5 reduces the rotation speed of the driving shaft 4 to be transmitted to the load sheave 3. The first and second side plates 1 and 2 arefixed to each other and spaced at a predetermined interval through four stay bolts shown in Fig.1, and a mounting shaft 33 for mounting a hook 34 is supported between the side plates 1 and 2 and at one side on the tangential line of the load sheave 3 (at the upper sides in Figs.1 and 4).

A driven member 6 having a flange is screwably connected with the axially outside portion of the driving shaft 4 projecting from the first side plate 1, a driving member 7 having at the outer periphery thereof toothed portions 71 is screwed with the driving shaft 4 at the axial outside of the driven member 6, between the driving member 7 and the driven member 6 is interposed a braking ratchet wheel 10 put between a pair of linings 8 and 9, and outside the first side plate 1 and at an extension of the mounting shaft 33 is mounted a braking pawl 11 engageable with the braking ratchet wheel 10 to block reverse rotation thereof, these components forming a mechanical brake 50.

Furthermore, at the radial outside of the driving member 7 is provided an operating lever 14 having a pawl member 12 provided with a normal and reverse rotation pawl engageable with the toothed portions provided at the outer periphery of the driving member 7 and an operating portion 13 for engaging or disengaging the pawl member 12 with or from the toothed portions, the lever 14 being operated to rotate the driving member 7 normally or reversely through the pawl member 12 selectively engageable with the toothed portions 71, thereby hauling or loosening the chain engaging with the load sheave 3.

A free rotation control mechanism for making the load sheave 3 freely rotatable is provided axially outside of the driving member 7. In detail, at the axially outer end of driving shaft 4 is provided serration 40, onto which a pair of sleeves 41 and 42 are fitted, a flange 41a is provided at the first sleeve 41, a stopper 43 is serration-coupled with the axial end of serration 40 at the axial outside of the second sleeve 42, a nut 44 screws with a screw thread at the driving shaft 4 at the axial outside of the serration 40, and the nut 44 is tightened to fix the stopper 43 to the driving shaft 4 through the sleeves 41 and 42.

An operating handle 15 is fitted onto the second sleeve 42 and interposed between the stopper 43 and the driving member 7 in relation of being movable axially of the driving shaft 4 and rotatable, and ridges 15a are provided at the inner periphery of the operating handle 15, the ridges 15a engaging with engaging grooves 43a provided at the outer periphery of stopper 43 respectively, whereby the operating handle 15 is made not-relative-rotatable with respect to the driving shaft 4 through the stopper 43.

Between the operating handle 15 and the stopper 43 is provided an elastic biasing member 48 comprising a coil spring in contact with the side surfaces of the operating handle 15 and stopper 43, the elastic member 48 biasing the operating handle 15 toward the flange 41a at the first sleeve 41, in other words, in the direction of moving away from the stopper 43, that is, toward the driving member 7.

Furthermore, at the radial end of the rear surface of a boss of the operating handle 15 are provided two engaging projections 45 projecting toward the driving member 7, and at the opposite side of driving member 7 to the boss of the operating handle 15 are symmetrically provided a pair of projections 46, so that at the projections 46 are provided free rotation control surfaces 47 which, when the operating handle 15 is moved away from the driving member 7 and relative-rotated thereto, is biased by the elastic biasing member 48 so as to be brought into contact with the projecting utmost ends of the engaging projectons 45. In a case where the free rotation control mechanism is operated, at first, the operating handle 15 is moved away from the driving member 7 and, in this state, is rotated to engage the engaging projections 45 with the free rotation control surfaces 47 as shown in Fig.4, at which time since the driving shaft 4 normally rotates, the driving member 7 screws backwardly from the driven member 6. Accordingly, in this state, the load sheave 3 becomes freely rotatable and since the engaging projections 45 are biased by the elastic biasing member 48 so as to come into elastic contact with the free rotation control surfaces 47, the driving member 7 is given resistance against its relative rotation with respect to the driving shaft 4 so as to rotate together therewith under the resistance, thereby maintaining the load sheave 3 in the free rotation state. Accordingly, the chain engageable with the load sheave 3 can freely be drawn out at the load or no-load side due to the free rotation of load sheave 3.

In such the state, when the chain is intensively pulled at the load side to be heavily loaded, the driving member 7 overcomes the resistance to relative-rotate with respect to the driving shaft 4 and the free rotation control is released to lead to reoperation of the mechanical brake 50.

In the Fig.1 embodiment of the lever type traction machine of the present invention constructed as the above-mentioned, at both radial sides of the load sheave 3 are disposed a pair of chain holders 17 for holding toward the load sheave 3 the chain 16 entering between the side plates 1 and 2 to engage with the load sheave 3, the chain holders 17 being provided at the rear side thereof in the entering direction of the chain between the chain holders 17 and the load sheave 3 with chain bulging restraint portions 18 for restraining the chain 16 from radially bulging from the load sheave 3 at the rear side thereof.

In other words, as shown in Fig.1, at the load sheave 3 engageable with the chain 16 is provided with a plurality of projections 19 for catching the chain 16, so that, when the load sheave 3 rotates, the chain 16 is adapted to be drawn into between the side plates 1 and 2 through the projections 19. Namely, when the load sheave 3 is driven normally, in other words, clockwise in Fig.1, the chain 16 is hauled at the load side (the leftside in Fig.1) so as to enter between the side plates 1 and 2 from the outside thereof to the inside and guided by one chain holder 17 provided at the load side, so as to rotatably engage with the load sheave 3 without rising therefrom and then guided by the other chain holder 17 provided at the no-load side so as to be drawn out from between the side plates 1 and 2.

When the load sheave 3 is rotated reversely, that is, counterclockwise in Fig.1, the chain 16 enters at the no-load side (right side in Fig.1) from the outside of the side plates to the insides thereof, is guided by the other chain holder 17 provided at the no-load side so as to rotatably engage with the load sheave 3 without rising therefrom, and is guided by the other chain holder 17 provided at the load side so as to be drawn out from between the side plates 1 and 2.

In the above-mentioned construction, when the load sheave 3 is normally rotated, the chain 16 enters at the load side thereof into between the side plates 1 and 2 from the outsides thereof to the insides. When reversely rotated, the chain 16 enters at the no-load side as the above-mentioned. The chain holders 17, as shown in Figs.1 and 2, are provided at both the inside surfaces with rectangular projections 20 respectively, and rectangular fitting bores 21, into which the rectangular projections 20 are fitted, are provided at the side plates 1 and 2 and inside of the stay bolts 22 provided at both lateral sides of the load sheave 3 respectively, the rectangular projections 20 being fitted into the rectangular fitting bores 21, and nuts 44 are fixedly screwed with the stay bolts 22 respectively, thereby not-rotatably sandwiching the chain holders 17 between the side plates 1 and 2.

Each chain holders 17 is heat-treated to improve its strength so as to bear contact with the chain 16 and forms a groove 23 at the opposite surface to the load sheave 3, so that at the bottom of the grove 23, as shown in Figs.1 and 2, forms a biasing surface for biasing a vertical link 16a toward the load sheave 3 and at the inner surfaces of the groove 23 form biasing surfaces for biasing a horizontal link 16b, so that, as shown in Fig.1, these biasing surfaces each are formed in an inwardly facing circular arc around the axis of load sheave 3, thereby biasing toward the load sheave 3 the chain 16 engaging therewith. The chain swelling restraint portions 18 are provided at the chain holders 17 and at the rear side in the entering direction of the chain 16 when entering between the side plates 1 and 2 from the outsides thereof to the insides, and guide portions 25 are provided at the chain holders 17 and at the front of the entering directin of the chain 16 when entering as it is twisted, thereby forcibly correcting the twist of chain 16.

The chain bulging restraint portions 18, as shown in Fig.1, each are extended at the rear portion of the biasing surface in the chain entering direction to be formed along the rotation path of the load sheave 3. When the chain 16 guided by the biasing surface is intended to bulge in the tangential line of the rotary path of load sheave 3, the chain bulging restraint portions 18 can restrain the chain 16 from bulging.

Each guide 25 is formed in such a manner that each biasing surface is somewhat extended at the front in the chain entering direction along the tangential line of the rotary path of the load sheave 3 and then outwardly extended in an outwardly facing circular arc and formed in continuation of the groove 23. As shown in Fig.3, each corner between the biasing surface for the horizontal link 16b and the groove 23 is rounded so that at the round corner is formed a first correction portion 25a for correcting the twist of the vertical link 16a, and each inner surface of the guide 25 in continuation of the biasing surface for the horizontal link 16b, that is, each inner surface positioned at both sides of the groove 23, forms a second correcting portion 25b for correcting the twist of the horizontal link 16b.

In addition, in Fig.1, reference numeral 30 designates a chain stopper put between the side plates 1 and 2. The chain stopper 30 has at both lateral sides rectangular projections 31 as the same as the chain holder 17, the projectons 31 being fitted into rectangular fitting bores 32 provided at the side plates 1 and 2. The chain stopper 30 and the chain holders 17 are sandwiched between the side plates 1 and 2.

Next, explanation will be given on operation of the lever type traction machine constructed as the above-mentioned.

At first, when the chain 16 is hauled, the operating lever 14 is operated to normally rotate the driving member 7 and the driving shaft 4 is driven through the mechanical brake 50 so as to rotate the load sheave 3 normally, clockwise in Fig.1. When traction is released, the operating lever 14 is operated to reversely rotate the driving member 7 and release the mechanical brake 50. Therefore,the driving shaft 4 and load sheave 3 are rotatable, counterclockwise in Fig.1, thereby reversely rotating the load sheave 3 by the load. In addition, such reverse rotation is limited in a range of reversely rotating the driving member 7 by operating the operating lever 14. When the reverse rotation exceeds the range, the mechanical brake 50 acts to block further reverse rotation. Accordingly, the operating lever 14 is repeatedly operated to enable the traction to be released.

In the no-load state where traction is released, the chain 16 is drawn out from the load sheave 3 to the load side or retracted to the no-load side, in brief, when the load sheave 3 is controlled to be in the free rotation state so as to adjust the chain 16 in length, the operating handle 15 is operated as the above-mentioned.

It is not problematical that the lever type traction machine hauls the load, releases the traction or free-rotation-controls to adjust the chain 16 in

length while being kept vertical, that is, the picture plane of Fig.1 keeps the upper portion thereof above. However, when the same is turned sidewise or upside down, that is, when the picture plane of Fig.1 keeps the lower portion below, especially when the traction is released or the load sheave 3 is free-rotation-controlled to adjust the chain in length, the chain 16 entering from the outside to the inside of side plates 1 and 2 is intended to swell at the rear of each chain holder 17, but since each chain holder 17 is provided with the chain bulging restraint portion 18, the chain 16 can be restrained from bulging at the rear of the chain holder 17, whereby the chain 16 can be prevented from interfering with the stay bolt 22 or the hook mounting portion 32, or from intertwining with each other to hinder smooth rotation of the load sheave 3 so as to lock its rotation.

In a case where the load sheave 3 is free-rotatably controlled to adjust the chain 16 in length, when the chain 16 is intensively pulled or is intended to enter, while being twisted, between the load sheave 3 and the chain holder 17, the vertical links 16a and horizontal links 16b of the chain 16 all are corrected by the guide 25 of entering posture, whereby the twist of chain 16 is eliminated of its twist and enters between the chain holder 17 and the load sheave 3. Accordingly the chain 16 can be prevented from being caught by the chain holder 16 at the front thereof in the entering direction to lead to locking of rotation of the load sheave 3.

The chain holders 17 are sandwiched between the side plates 1 and 2 by fitting the rectangular projections 20 thereof into the rectangular bores 21 at the side plates 1 and 2 and are fixed thereto by the stay bolts 22, thereby being restricted of rotation. Also, each chain holder 17, as shown in Fig.1, is positioned inside of and close to the stay bolts 22, and can come into contact at the rear surface therewith. Accordingly, the counterclockwise rotation moment of the chain 16 acting on each chain holder 17 can be carried also by the stay bolt 22.

The chain holders 17 are not constructed to allow the stay bolt 22 to perforate therethrough as the conventional, thereby being simple in construction to that extent, resulting in that the same can be miniaturized,and be simple to machine and assemble.

As seen from the above, in the lever type traction machine of the present invention which is so contructed that the load sheave 3 engageable with the chain 16 is interposd between the side plates 1 and 2 and the operating lever 14 is operated to drive the load sheave 3 so as to haul the chain 16, the pair of chain holders 17, which hold toward the load sheave 3 the chain 16 entering between the side plates 1 and 2 to engage with the load sheave,are provided. At the rear side of each chain holder 17 in the entering direction of the chain 16 when entering between the side plates 1 and 2 from the outside to the inside thereof is provided the chain swelling restraint portion 18 for restraining the chain 16 from swelling radially outwardly of the load sheave 3, so that in a case where the lever type traction machine is operated while being turned sidewise or upside down, especially the traction is released or the load sheave 3 is free-rotatably controlled to adjust the chain 16 in length, even when the chain 16 is intended to bulge by its gravity at the rear side of the chain holder 17, the chain bulging restraint portions 18 can restrain the chain 16 from bulging. Accordingly, the chain 16, which does not swell at the rear side of the chain holder 17, can be prevented from bulging to interfere with the stay bolt or the like or intertwine with each other to hinder smooth ratation of the load sheave 3.

The guides 25 provided ahead in the entering direction of the chain 16 into between the load sheave 3 and the chain holder 17 and for correcting twist of the chain 16, even when the chain 16 is intensively pulled during the free rotation and the chain is intended to enter therebetween while being twisted, can forcibly correct and eliminate the twist. Accordingly, the chain 16 can be prevented from being caught by the chain holder 17 to lock the load sheave 3.

Also, the rectangular projections 20 are provided at both the side surface of the chain holder 17 opposite to the side plates 1 and 2, and rectangular bores 21 engageable with the rectangular projections 20 are provided at the chain holder mounting portions at the side plates 1 and 2 and the chain holders 17 are fixedly sandwiched between the side plates 1 and 2 by the stay bolts 22, whereby the chain holders 17 can effectively be locked and the insertion bores for the stay bolts as the conventional example need not be provided, thereby enabling the lever type traction machine to be miniaturized and be simple to machine and assemble.

While a preferred embodiment of the invention has been described using specific terms, such description is for illustrative purpose only, and it is to be understood that changes and variations may be made without departing from the scope of the following claims.

Claims

1. A lever type traction machine provided with a pair of side plates, a load sheave interposed between said side plates, and an operating lever for driving said load sheave, so that said operating lever is operated to drive said load

sheave and haul a chain engageable with said load sheave, said machine comprising;
a pair of chain holders disposed at both radial sides of said load sheave between said side plates and for holding toward said load sheave said chain entering between said side plates to engage with said load sheave, each of said chain holders being provided at the rear side in the entering direction of said chain when entering from the outside of said load sheave to the inside thereof with a chain bulging restraint portion for restraining said chain from bulging radially outwardly of said load sheave at the rear of said chain holder.

2. A lever type traction machine according to claim 1, wherein each of said chain holders is provided at the front in the entering direction of said chain between said chain holder and said load sheave with a guide for correcting twist in said chain entering between said chain holder and said load sheave.

3. A lever type traction machine according to claim 1, wherein each of said chain holders is provided at both side surfaces thereof opposite to said side plates with rectangular projections projecting from said side surfaces respectively and each of said side plates is provided at a mounting portion of each of said chain holders with a rectangular fitting bore into which said rectangular projection is fitted, said side plates being fixed to each other by a plurality of stay bolts so that each of said chain holders is sandwiched between said side plates when fixed by said stay bolts.

4. A lever type traction machine according to claim 3, wherein said stay bolts are disposed at the rear surface sides of said chain holders respectively, said rear surface of each of said holders being close to the outer surface of each of said stay bolts.

FIG. 1

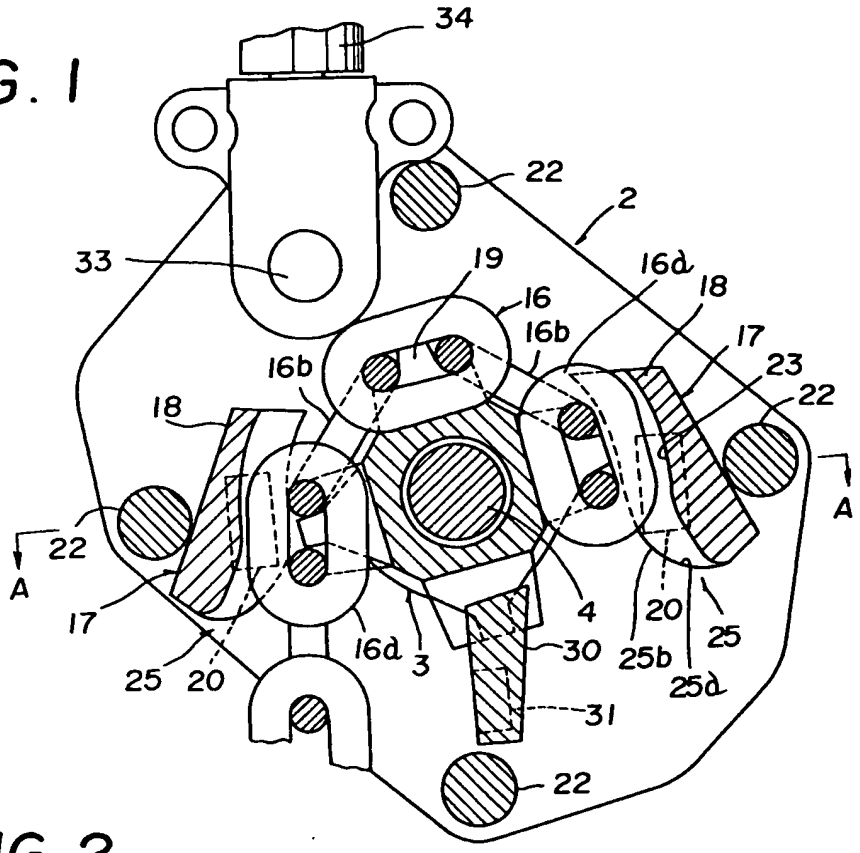
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FIG. 2

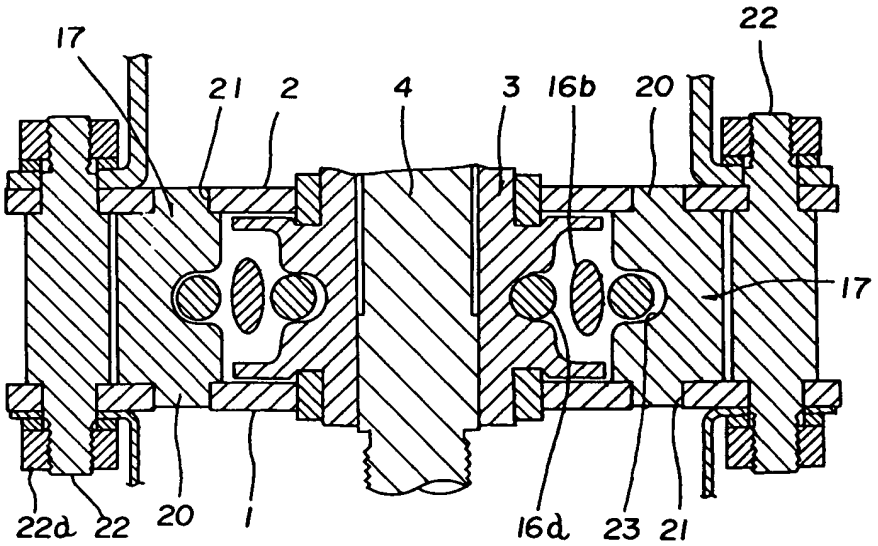
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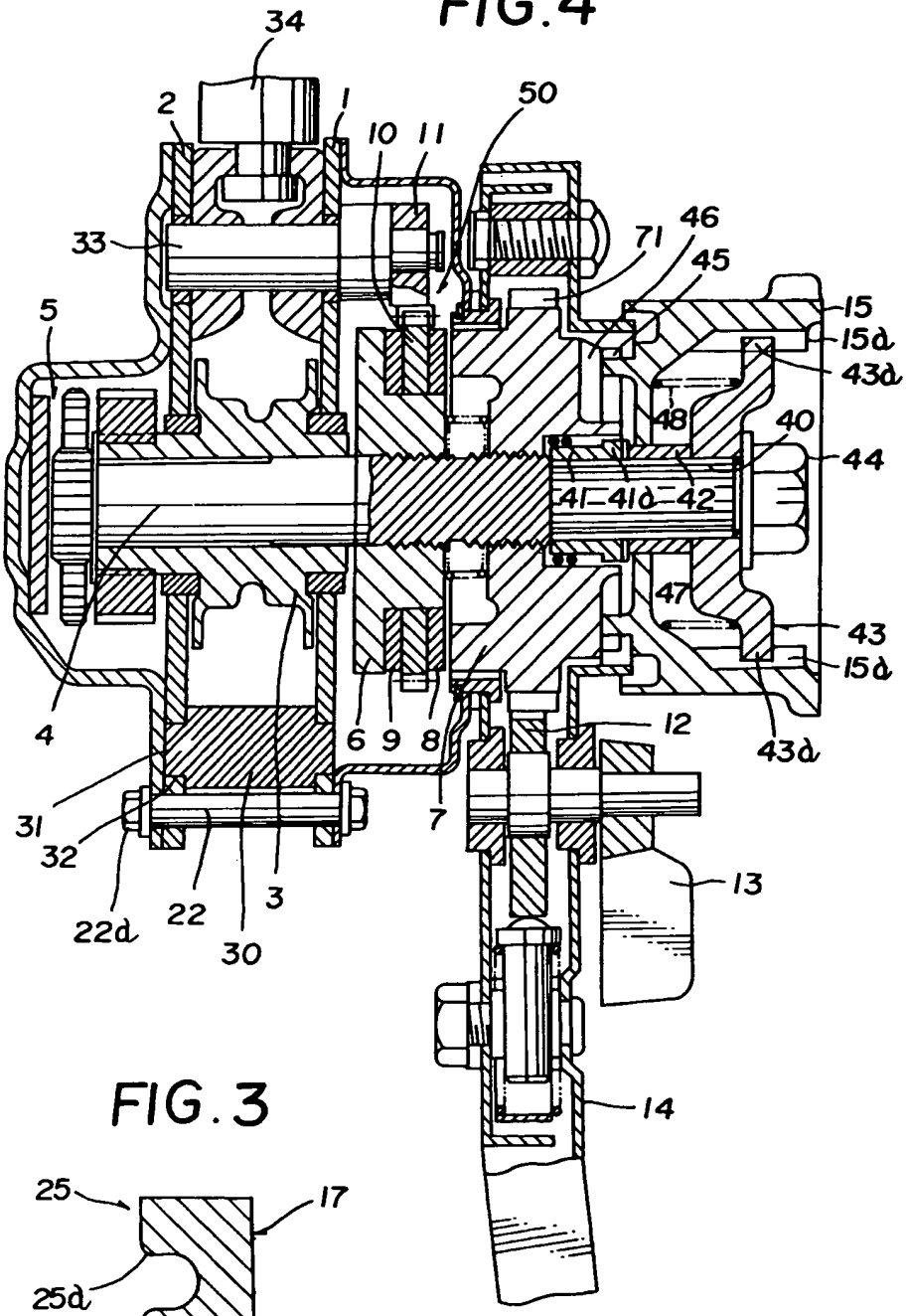
FIG.4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43a
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22d
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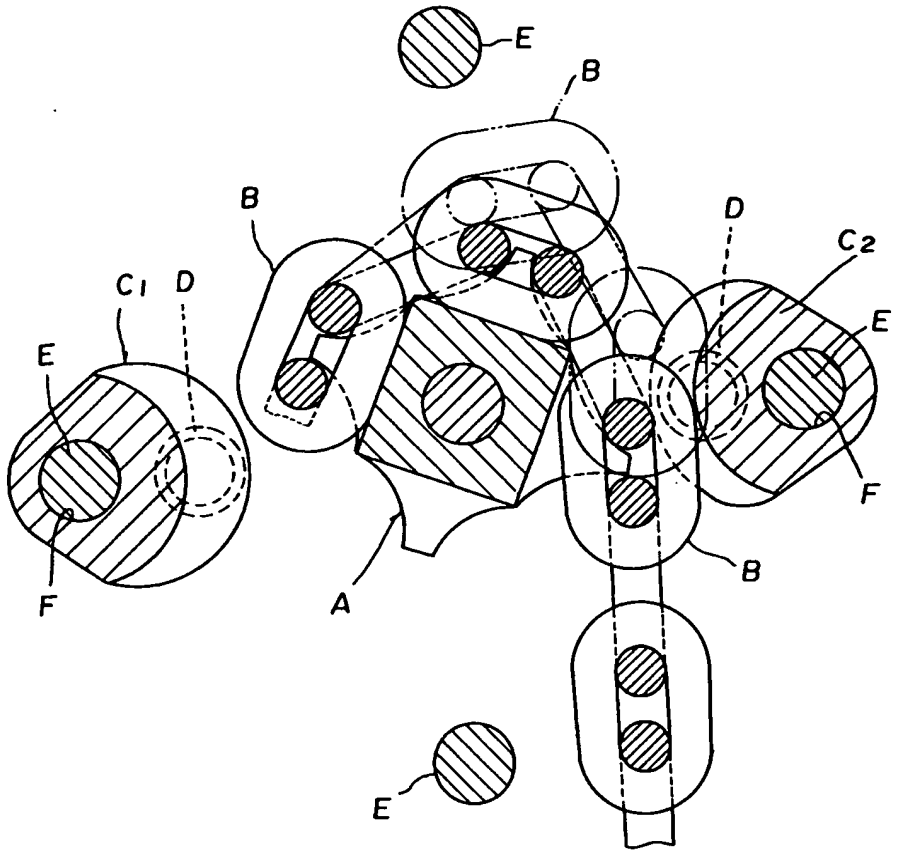
14

FIG.3

25
17
25a
25b

FIG. 5 (PRIOR ART)



European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 92 30 4319

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Y A	US-A-1 458 354 (NELLER) * page 1, line 46 - line 96 * * page 1, line 105 - page 2, line 3 * * page 2, line 23 - line 48 * * figures * ---	1,2 3,4	B66D3/14 B66D3/26
Y A	US-A-5 007 617 (NISHIMURA ET AL.) * abstract; figures * ---	1,2 3	
Y	FR-A-1 215 373 (KING) * page 1, right column, line 28 - line 35; figures * * page 2, left column, line 4 - line 8 * * page 2, left column, line 18 - line 21 * ---	1,2	
A	GB-A-629 671 (TRIGGS) * page 2, line 81 - line 100 * * figures 3,4,9,10 * ---	1-3	
A	US-A-2 477 783 (BRITT) * figure 1 * ---	1,2	TECHNICAL FIELDS SEARCHED (Int. Cl.5)
A	DE-A-2 548 569 (INSTITUT FÜR FÖRDERTECHNIK LEIPZIG) * page 6, line 11 - line 14 * * figure 1 * ---	2	B66D
A	US-A-1 572 001 (DOTZERT) -----		

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	05 FEBRUARY 1993	GUTHMULLER J.A.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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